PRESOLAR SILICATE AND OXIDE DUST IN ALHA77307. M. Bose, C. Floss and F. J. Stadermann. Laboratory for Space Sciences and Physics Dept., Washington University, St. Louis, MO 63130. E-mail: mbose@physics.wustl.edu.

Introduction: Presolar silicates are the newest addition to the presolar grain inventory. Abundant sub-micrometer silicate grains have been identified and characterized to date [e.g., 1–4]. Here we report results from searches for O-bearing presolar grains in the CO3 chondrite, ALHA77307.

Experimental: The NanoSIMS was used to search for isotopically anomalous grains in a thin-section of ALHA77307 by rastering a primary Cs^+ beam of about 1 pA over 10×10 μm^2 areas and collecting $^{12,13}C^-$ and $^{16,17,18}O^-$ secondary ions and secondary electrons in multi-collection mode. Compositional information was obtained for grains with anomalous O isotopic compositions with the Auger Nanoprobe.

Results and Discussion: Oxygen-isotopic imaging of 16,900 μm^2 of matrix led to the identification of 67 O-anomalous grains. The estimated abundance of O-anomalous grains in ALHA77307 is about 120 ppm (without correcting for detection efficiency) which is similar within errors to that found by [5]. The majority (85%) of the grains exhibit ^{17}O enrichments with solar to sub-solar $^{18}O/^{16}O$ ratios (group 1). Three grains show ^{18}O depletions accompanied with ^{17}O enrichments (group 2). Two grains contain depletions in both of the heavier isotopes of O (group 3) while five grains are ^{18}O-rich (group 4). Thus the grains cover all four isotopic groups previously identified for presolar oxides [6].

Auger analyses of 44 grains revealed 36 grains with ferromagnesian silicate compositions; a few grains also contain Ca and/or Al. Three additional silicate grains have Mg-rich end-member compositions and two have Fe-rich end-member compositions. The Auger spectra of two grains are dominated by large Si and O peaks with an O/Si ratio of about 2.2±0.3, compatible with a SiO_2 stoichiometry. An Fe-oxide grain has also been found. The remaining grains are currently being characterized.

Of the silicate grains investigated so far, 14 are Fe-rich while eight are Mg-rich. The remaining grains have mg#s between 45% and 55%. The high Fe concentrations in many of the grains may be of a primary origin [7] or a result of secondary processing [e.g., 8]. The distribution of Fe contents in the presolar silicate grains in ALHA77307 is similar to that seen in the CR3 chondrites [2]. In contrast, Acfer 094 contains more silicate grains with high Fe contents [9], which may indicate that it experienced more secondary processing than these other meteorites.

Most group 4 (^{18}O-rich) silicate grains that have been characterized (e.g., 10 out of 15 [1, 2, 4, this study]) are Fe-rich. It has been argued that these grains formed in supernovae [10]. If this is the case and if the Fe is incorporated into silicates in stellar outflows, this may imply that non-equilibrium condensation is the preferred mechanism for dust formation in supernovae.

References: [1] Bose M. et al. (2009) *ApJ*, in preparation. [2] Floss C. & Stadermann F. J. (2009) *GCA*, 73, 2415-2440. [3] Nguyen A. N. et al. (2007) *ApJ*, 656, 1223-1240. [4] Vollmer et al. (2009) *GCA*, submitted. [5] Nguyen et al. (2008) *LPSc XXXIX*, #2142. [6] Nittler et al. (1997) *ApJ*, 483, 475-495. [7] Ferrarotti A. S. & Gail H. -P. (2001) *A&A*, 371, 133-151. [8] Jones R. H. & Rubie D. C. (1991) *E&PScL*, 106, 73-86. [9] Bose M. et al. (2008) *M&PS*, 43, A27. [10] Nittler et al. (2008) *ApJ*, 682, 1450-1478.